

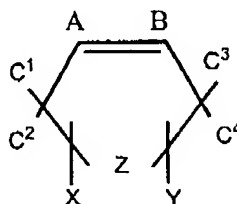
Appendix 1
Serial No. 10/649747
May 18, 2009

WE CLAIM

1. (Presently Amended) A film comprising at least one layer, the layer comprising an oxygen scavenger composition consisting essentially of a transition metal salt, compound or complex and a block copolymer, wherein said block copolymer comprises:

(A) at least one first prepolymer (P^A) block segment composed of mer units derived from

(a) at least one or a mixture of substituted alicyclic compounds having non-aromatic, ethylenic functionality according to the following representation:



wherein

A, B, C^1 , C^2 , C^3 , C^4 each independently represents hydrogen or a C_qH_{2q+1} hydrocarbyl group with q being an integer in the range of from 0 to 20, provided that either A or B and at least one of C^1 , C^2 , C^3 , C^4 are hydrogen atoms and each carbon atom of the alicyclic ring is fully substituted by groups selected from hydrogen, hydrocarbyl, X groups, Y groups and mixtures thereof;

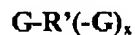
X and Y each independently or together represents functional groups capable of being part of a heteroatom containing linkage forming a covalent bond linkage between the cycloalkenyl containing group and other mer groups forming the first polymer block segment; and

Z being selected from a $-(C_tH_{2t})-$ hydrocarbylene group with t

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being an integer in the range from 1-4; and

(b) at least one or a mixture of di- or polyfunctional hydrocarbon compounds according to the following representation:



wherein

R' represents a non-aromatic or aromatic hydrocarbon group; and
each G independently represents a functional group capable of being part of a heteroatom containing linkage between the hydrocarbon group R' and the other mer groups forming the first prepolymer block segment; and
x is at least 1; and

(B) at least one second prepolymer (P^B) block segment derived from a monofunctional or polyfunctional polymers represented by the formula



wherein

P represents a polymer capable of forming a film and being thermoplastic at temperatures higher than room temperature; and
J represents functional group capable of being part of a heteroatom containing linkage forming a covalent bond linkage between the first prepolymer (P^A) and the second prepolymer (P^B) and p is 1 or 2;

wherein at least one functional group of prepolymer (P^A) is capable of forming heteroatom containing linkage with functional group J of prepolymer (P^B), polymer block segment (P^A) is present in from 20 to 80 weight percent and polymer block segment (P^B) is present in from 80 to 20 weight percent of said block copolymer and said prepolymer polymer (P^A) has a T_g of lower than about minus 20°C and said prepolymcrpolymer (P^B) has a T_m of higher than +30°C.

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2. (Original) The film of claim 1 wherein functional groups X, Y and G of said first prepolymer (P^A) are each independently selected from the group consisting of $-(CH_2)_n-OH$, $-(CH_2)_n-NH_2$, $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C=O)-D$ with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C_1 - C_{12} alkyl group, or X and Y together or two G groups together represent $-((CH_2)_n-C=O)_x-D$ with n being an integer in the range from 0 to 20, D is oxygen atom and x is 2, provided that said functional groups have a molar ratio of (i) hydroxyl and amino functional groups to (ii) carboxylic acid, carboxylic acid ester, carboxylic acid halide and isocyno functional groups of from 0.9:1 to 1.1:1 and sufficient to provide residual functional groups on said first prepolymer.

3. (Presently Amended) The film of claim 1 wherein the (a) of prepolymer (P^A) is selected from tetrahydrophthalic acid, dimethyl tetrahydrophthalate, tetrahydrophthalic anhydride or mixtures thereof.

4. (Presently Amended) The film of claim 1 wherein (b) of prepolymer (P^A) is selected from C_2 - C_{20} alkylene glycol or poly(C_2 - C_4 alkylene) glycol.

5. (Previously Presented) The film of claim 1 wherein J of the second prepolymer (P^B) is selected from hydroxyl or amino groups or mixtures thereof and wherein the residual functional groups of said first prepolymer (P^A) is selected from $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C=O)-D$ with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C_1 - C_{12} alkyl group or X and Y together represent $-((CH_2)_n-C=O)_x-D$ with n being an integer in the range from 0 to 20, D is oxygen atom and x is 2.

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6. (Original) The film of claim 1 wherein J of the second prepolymer (P^B) is selected from $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C(=O)-D$ with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C_1-C_{12} alkyl group and wherein the residual functional groups of said first prepolymer (P^A) is selected from hydroxyl or amino groups or mixtures thereof.

7. (Presently Amended) The film of claim 1 wherein P of the second ~~prepolymer~~ polymer (P^B) is selected from C_2-C_4 polyolefins, polyesters, polystyrene, polyamide, polylactic acid, polyalkyllactone and mixtures thereof and P has a molecular weight, M_w , of at least 1000.

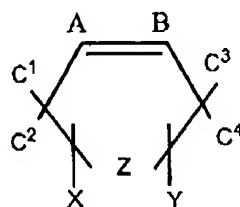
8. (Original) The film of claim 1 wherein P of the block copolymer is derived from beta-propiolactone, beta-butyrolactone, gamma-valerolactone, 1,4-dioxane-2-one, 1,4-dithiane-2,5-dione, trimethylene carbonate, neopentylene carbonate, ethylene oxalate, epsilon-caprolactone, caprolactam, lactide or glycolide or mixtures thereof.

9. (Presently Amended) A laminated product comprising a plurality of layers, including

i) at least one layer, the layer comprising an oxygen scavenger composition consisting essentially of a transition metal salt, compound or complex and a block copolymer, wherein said block copolymer comprises:
(A) at least one first prepolymer (P^A) block segment composed of mer units derived from

(a) at least one or a mixture of substituted alicyclic compounds having non-aromatic, ethylenic functionality according to the following representation:

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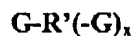
wherein

A, B, C¹, C², C³, C⁴ each independently represents hydrogen or a C_qH_{2q+1} hydrocarbyl group with q being an integer in the range of from 0 to 20, provided that either A or B and at least one of C¹, C², C³, C⁴ are hydrogen atoms and each carbon atom of the alicyclic ring is fully substituted by groups selected from hydrogen, hydrocarbyl, X groups, Y groups and mixtures thereof;

X and Y each independently or together represents functional groups capable of being part of a heteroatom containing linkage forming a covalent bond linkage between the cycloalkenyl containing group and other mer groups forming the first polymer block segment; and

Z being selected from a -(C_tH_{2t})- hydrocarbylene group with t being an integer in the range from 1-4; and

(b) at least one or a mixture of di- or polyfunctional hydrocarbon compounds according to the following representation:



wherein

R' represents a non-aromatic or aromatic hydrocarbon group; and

each G independently represents a functional group capable of being part of a heteroatom containing linkage between the hydrocarbon group R' and the other mer groups forming the first prepolymer block segment; and x is at least 1; and

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(B) at least one second prepolymer (P^B) block segment derived from a monofunctional or polyfunctional polymers represented by the formula



wherein

P represents a polymer capable of forming a film and being thermoplastic at temperatures higher than room temperature; and J represents functional group capable of being part of a heteroatom containing linkage forming a covalent bond linkage between the first prepolymer (P^A) and the second prepolymer (P^B) and p is 1 or 2;

wherein at least one functional group of prepolymer (P^A) is capable of forming heteroatom containing linkage with functional group J of prepolymer (P^B), polymer block segment (P^A) is present in from 20 to 80 weight percent and polymer block segment (P^B) is present in from 80 to 20 weight percent of said block copolymer and said polymer-prepolymer (P^A) has a T_g of lower than about minus 20°C and said polymer-prepolymer (P^B) has a T_m of higher than +30°C.; and

ii) at least one layer comprising a material selected from the group consisting of

- a) a polymeric article,
- b) a paper article, and
- c) a metal article.

10. (Original) The laminated product of claim 9 wherein functional groups X, Y and G of said first prepolymer (P^A) are each independently selected from the group consisting of $-(CH_2)_n-OH$, $-(CH_2)_n-NH_2$, $-(CH_2)_n-N=C=O$ and

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$-(CH_2)_n-C=O)-D$ with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an $-H$ or C_1-C_{12} alkyl group, or X and Y together or two G groups together represent $-((CH_2)_n-C=O)_x-D$ with n being an integer in the range from 0 to 20, D is oxygen atom and x is 2, provided that said functional groups have a molar ratio of (i) hydroxyl and amino functional groups to (ii) carboxylic acid, carboxylic acid ester, carboxylic acid halide and isocyno functional groups of from 0.9:1 to 1.1:1 and sufficient to provide residual functional groups on said first prepolymer.

11. (Presently Amended) The laminated product of claim 9 wherein the (a) of prepolymer (P^A) is selected from tetrahydrophthalic acid, dimethyl tetrahydrophthalate, tetrahydrophthalic anhydride or mixtures thereof.

12. (Presently Amended) The laminated product of claim 9 wherein (b) of prepolymer (P^A) is selected from C_2-C_{20} alkylene glycol or poly(C_2-C_4 alkylene) glycol.

13. (Previously Presented) The laminated product of claim 9 wherein J of the second prepolymer (P^B) is selected from hydroxyl or amino groups or mixtures thereof and wherein the residual functional groups of said first prepolymer (P^A) is selected from $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C=O)-D$ with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an $-H$ or C_1-C_{12} alkyl group or X and Y together represent $-((CH_2)_n-C=O)_x-D$ with n being an integer in the range from 0 to 20, D is oxygen atom and x is 2.

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14. (Previously Presented) The laminated product of claim 9 wherein J of the second prepolymer (P^B) is selected from $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C=O$ -D with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C_1 - C_{12} alkyl group and wherein the residual functional groups of said first prepolymer (P^A) is selected from hydroxyl or amino groups or mixtures thereof.

15. (Presently Amended) The laminated product of claim 9 wherein P of the block copolymer derived from the second polymer-prepolymer (P^B) is selected from C_2 - C_4 polyolefins, polyesters, polystyrene, polyamide, polylactic acid, polyalkylactone and mixtures thereof and P has a molecular weight, M_w , of at least 1000.

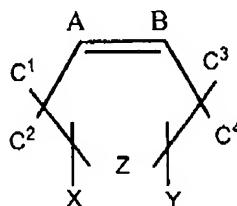
16. (Presently Amended) The laminated product of claim 9 wherein P of the block copolymer derived from second prepolymer (P^B) is selected from is derived from beta-propiolactone, beta-butyrolactone, gamma-valerolactone, 1,4-dioxane-2-one, 1,4-dithiane-2,5-dione, trimethylene carbonate, neopentylene carbonate, ethylene oxalate, epsilon-caprolactone, caprolactam, lactide or glycolide or mixtures thereof.

17. (Presently Amended) An oxygen scavenger composition consisting essentially of a transition metal salt, compound or complex and a block copolymer, wherein said block copolymer comprises:

(A) at least one first prepolymer (P^A) block segment composed of mer units derived from

(a) at least one or a mixture of substituted alicyclic compounds having non-aromatic, ethylenic functionality according to the following representation:

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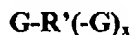
wherein

A, B, C¹, C², C³, C⁴ each independently represents hydrogen or a C_qH_{2q+1} hydrocarbyl group with q being an integer in the range of from 0 to 20, provided that either A or B and at least one of C¹, C², C³, C⁴ are hydrogen atoms and each carbon atom of the alicyclic ring is fully substituted by groups selected from hydrogen, hydrocarbyl, X groups, Y groups and mixtures thereof;

X and Y each independently or together represents functional groups capable of being part of a heteroatom containing linkage forming a covalent bond linkage between the cycloalkenyl containing group and other mer groups forming the first polymer block segment; and

Z being selected from a -(C_lH_{2l})- hydrocarbylene group with l being an integer in the range from 1-4; and

(b) at least one or a mixture of di- or polyfunctional hydrocarbon compounds according to the following representation:



wherein

R' represents a non-aromatic or aromatic hydrocarbon group; and each G independently represents a functional group capable of being

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part of a heteroatom containing linkage between the hydrocarbon group R' and the other mer groups forming the first prepolymer block segment; and x is at least 1; and

(B) at least one second prepolymer (P^B) block segment derived from a monofunctional or polyfunctional polymers represented by the formula



wherein

P represents a polymer capable of forming a film and being thermoplastic at temperatures higher than room temperature; and J represents functional group capable of being part of a heteroatom containing linkage forming a covalent bond linkage between the first prepolymer (P^A) and the second prepolymer (P^B) and p is 1 or 2;

wherein at least one functional group of prepolymer (P^A) is capable of forming heteroatom containing linkage with functional group J of prepolymer (P^B), polymer block segment (P^A) is present in from 20 to 80 weight percent and polymer block segment (P^B) is present in from 80 to 20 weight percent of said block copolymer percent of said block copolymer and said polymer prepolymer (P^A) has a T_g of lower than about minus 20°C and said polymer prepolymer (P^B) has a T_m of higher than +30°C.

18. (Original) The composition of claim 17 wherein functional groups X, Y and G of said first prepolymer (P^A) are each independently selected from the group consisting of $-(CH_2)_n-OH$, $-(CH_2)_n-NH_2$, $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C=O)-D$ with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C_1-C_{12} alkyl group, or X and Y together or two G groups together represent $-((CH_2)_n-C=O)_x-D$ with n being an integer in the range from 0 to 20, D is

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oxygen atom and x is 2, provided that said functional groups have a molar ratio of (i) hydroxyl and amino functional groups to (ii) carboxylic acid, carboxylic acid ester, carboxylic acid halide and isocyano functional groups of from 0.9:1 to 1.1:1 and sufficient to provide residual functional groups on said first prepolymer.

19. (Presently Amended) The composition of claim 17 wherein the (a) of prepolymer (P^A) is selected from tetrahydrophthalic acid, dimethyl tetrahydrophthalate, tetrahydrophthalic anhydride or mixtures thereof.

20. (Presently Amended) The composition of claim 17 wherein (b) of prepolymer (P^A) is selected from C₂-C₂₀ alkylene glycol or poly(C₂-C₄ alkylene) glycol.

21. (Presently Amended) The composition of claim 17 wherein the first prepolymer (P^A) of the block copolymer comprises mer units derived from
(a) *cis*-1,2,3,6-tetrahydrophthalic anhydride; and
(b) 1,6-hexanediol.

22. (Original) The composition of claim 17 wherein J of the second prepolymer (P^B) is selected from hydroxyl or amino groups or mixtures thereof and wherein the residual functional groups of said first prepolymer (P^A) is selected from -(CH₂)_n-N=C=O and -(CH₂)_n-C=O)-D with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C₁-C₁₂ alkyl group or X and Y together represent -((CH₂)_n-C=O)_x-D with n being an integer in the range from 0 to 20, D is oxygen atom and x is 2.

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23. (Original) The composition of claim 17 wherein J of the second prepolymer (P^B) is selected from $-(CH_2)_n-N=C=O$ and $-(CH_2)_n-C=O$ -D with n being an integer in the range from 0 to 20 and D being selected from a halide atom or an OR group wherein R is an -H or C_1 - C_{12} alkyl group and wherein the residual functional groups of said first prepolymer (P^A) is selected from hydroxyl or amino groups or mixtures thereof.

24. (Presently Amended) The composition of claim 17 wherein P of the second ~~polymer~~ ~~prepolymer~~ (P^B) is selected from C_2 - C_4 polyolefins, polyesters, polystyrene, polyamide, polylactic acid, polyalkyllactone and mixtures thereof and P has a molecular weight, Mw, of at least 1000.

25. (Original) The composition of claim 17 wherein P of the block copolymer is derived from beta-propiolactone, beta-butyrolactone, gamma-valerolactone, 1,4-dioxane-2-one, 1,4-dithiane-2,5-dione, trimethylene carbonate, neopentylenc carbonate, ethylenc oxalate, epsilon-caprolactone, caprolactam, lactide or glycolide or mixtures thereof.

26. (Original) The composition of claim 17 wherein the transition metal salt is selected from the group consisting of cobalt neodcanoate, cobalt 2-ethylhexanoate, cobalt oleate, cobalt acetylacetonate, and cobalt 2-ethylbutyrate.

27. (Original) The composition of claim 17 wherein the composition comprises an effective amount of a photoinitiator.

28. (Original) The composition of Claim 17 wherein the composition comprises a diluent polymer selected from the group consisting of polyester,

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polyamides, polycarbonates, polyurethanes and polyethers, ethylene
polymers or copolymers, acrylate polymers, ethylene-vinyl alcohol
copolymer, polypropylene and polypropylene copolymers, styrene polymers
and styrene copolymers, vinyl chloride polymer and vinyl chloride
copolymers, polyvinylidene polymers and copolymers and mixtures thereof.